

Biostat 3

Heath's Key

23 responses

PBHL 5033/BIOM 5033
Turn-in Homework #1
September 2006

1. The first set of data that is used has two factors that are both repeated: Time and Supplement. The SAS code and output needed to answer the following questions are included.

a) Compare the compound symmetry (CS) and unstructured (UN) covariance structures by performing a statistical test. Use $\alpha = 0.05$.

H_0 : There is no difference in covariance structures.

H_a : There is a gain in the more complex structure.

Test statistic = $\frac{149.9 - 133.7}{56.2}$, $df = 36 - 2 = 34$, $\chi^2_{29, 0.05} \approx \chi^2_{30}$

Conclusion: There (is/is not) sufficient evidence to suggest that the UN covariance structure is useful compared to the CS covariance structure.

b) Compare the compound symmetry (CS) and Huynh-Feldt (HF) covariance structures by performing a statistical test. Use $\alpha = 0.05$.

H_0 : There is no difference in covariance structures.

H_a : There is a gain in the more complex structure.

Test statistic = $\frac{149.9 - 133.8}{16.1}$, $df = 9 - 2 = 7$, $\chi^2_{7, 0.05} = 14.0671$

Conclusion: There (is/is not) sufficient evidence to suggest that the HF covariance structure is useful compared to the CS covariance structure.

c) Using the output resulting from specifying the HF covariance structure with the "empirical" option, perform a statistical test for Time*Supplement interaction. (Use $\alpha = 0.05$).

H_0 : There is no Time * Supplement interaction.

H_a : There is Time * Supplement interaction.

P-value $\approx < 0.0001$

Conclusion: There (is/is not) sufficient evidence to suggest that there is Time*Supplement interaction.

Based on your conclusion, should you look at main effects? No

- d) Using the output resulting from specifying the HF covariance structure with the “empirical” option, fill in the following table of cell means.

		Time	
		0	1
Supplement	BC	6.4025	5.9392
	G	6.3966	4.1344
	K	6.2248	6.2870
	V	6.4649	6.3395

- e) Give the point estimate of the difference between the two time cell means for supplement “G.” 2.2622
- f) Perform a statistical test to determine if the two time cell means for supplement “G” are significantly different. Use $\alpha = 0.05$.

$$H_0: \mu_{G0} = \mu_{G1}$$

$$H_a: \mu_{G0} \neq \mu_{G1}$$

$$\text{Test statistic} = \underline{14.98}$$

$$\text{P-value} \approx \underline{< 0.0001}$$

Conclusion: There (is) sufficient evidence to suggest that the two time cell means associated with supplement “G” are significantly different.

- g) Give a 95% confidence interval for the difference between the two time cell means for supplement “G.”

$$\underline{(1.9538, 2.5705)}$$

2. The second set of data that is used has one group repeated on one factor. The SAS code and output needed to answer the following questions are included.

- a) Give the estimated covariance associated with treatment 1 and treatment 3.
3025.29

- b) Perform a statistical test of the equality of the 4 treatment means. Use $\alpha = 0.05$.

$$H_0: \mu_{t1} = \mu_{t2} = \mu_{t3} = \mu_{t4}$$

$$H_a: \text{Not } H_0$$

$$P\text{-value} \approx \underline{< 0.0001}$$

Conclusion: There ~~(is)~~ is not sufficient evidence to suggest that not all of the 4 treatment means are equal.

- c) Assuming the null hypothesis was rejected in part (b), how many pairs of treatment means are significantly different based on the Bonferroni adjusted 95% confidence intervals for the differences between treatment means? 4

- d) From the list below, circle the treatments that have significantly different means and display their 95 % confidence intervals.

T1 T2 (-73.3485 , 0.5064)

T1 T3 (-148.67 , -73.4327)

T1 T4 (-168.78 , -100.59)

T2 T3 (-114.30 , -34.9651)

T2 T4 (-140.24 , -56.2843)

T3 T4 (-55.5931 , 8.3300)